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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/546,586	08/24/2009	Anantha Pradeep	20225/028	3653

81905 7590 06/07/2017

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EXAMINER	
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ART UNIT	PAPER NUMBER
3735	

NOTIFICATION DATE	DELIVERY MODE
06/07/2017	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ANANTHA PRADEEP, ROBERT T. KNIGHT, and RAMACHANDRAN GURUMOORTHY[1]

Appeal 2016-001520
Application 12/546,586
Technology Center 3700

Before JEFFREY N. FREDMAN, RYAN H. FLAX, and DAVID COTTA *Administrative Patent Judges*.

FLAX, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) involving claims directed to a headset/apparatus (and method) for electroencephalography (EEG). Claims 49–68 and 70–78 are on appeal as rejected under 35 U.S.C. §§ 101, 112, first and second paragraphs, and 103(a). We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

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[1] Appellants identify the Real Party in Interest as The Nielsen Company (US), LLC. App. Br. 2.

STATEMENT OF THE CASE

The Specification states, "[t]he present disclosure relates to electrodes for electroencephalography (EEG)." Spec. ¶ 1. Further, the Specification describes,

> An electroencephalography (EEG) system includes a dry electrode design having a jagged, angular, comb, etc. shaped support housing. Each dry electrode housing includes multiple electrodes where each electrode has multiple contacts for scalp placement with minimal interference from hair. Signals from individual contacts may be disregarded and each housing may provide one or more aggregated signals for data analysis. Each electrode may be placed in close proximity with neighboring electrodes as no conductive gel is required and may be attached to the scalp using straps, elastic cap, spring-type materials, tape, etc. The dry electrode design effectively measures bio-signals including neurological activity.

Spec. ¶ 16. The Specification further describes using dry electrodes, where, "[t]o compensate for variable and/or fluc[tu]ating impedance, . . . each electrode selects a locally optimal or preferred signal from the different signals received from the multiple contacts." Spec. ¶ 21.

Claims 49, 68, and 78 are independent claims; they read as follows:

> 49. A headset comprising:
>
> a first electrode to provide a first local signal for analysis, the first local signal representative of a first biological response sensed at the first electrode, the first electrode comprising:
>
> > a first contact point to gather a first signal from a subject;
> >
> > a second contact point to gather a second signal from the subject;
> >
> > a third contact point to gather a third signal from the subject; and

a first selector to (1) discard one of the first signal, the second signal or the third signal based on a first characteristic of the first signal, a second characteristic of the second signal and a third characteristic of the third signal, and to (2) combine two of the first signal, the second signal and the third signal to form the first local signal representative of the first biological response, the two of the first signal, the second signal and the third signal excluding the discarded one of the first signal, the second signal and the third signal; and

a second electrode to provide a second local signal for analysis, the second local signal representative of the first biological response sensed at the second electrode, the second electrode comprising:

a fourth contact point to gather a fourth signal from the subject;

a fifth contact point to gather a fifth signal from the subject;

a sixth contact point to gather a sixth signal from the subject; and

a second selector to (1) discard one of the fourth signal, the fifth signal or the sixth signal based on a fourth characteristic of the fourth signal, a fifth characteristic of the fifth signal and a sixth characteristic of the sixth signal, and to (2) combine two of the fourth signal, the fifth signal and the sixth signal to form the second local signal representative of the first biological response, the two of the fourth signal, the fifth signal and the sixth signal excluding the discarded one of the fourth signal, the fifth signal and the sixth signal; and

a third selector to select one of the first local signal or the second local signal to represent the first biological response based on a seventh characteristic of the first local signal and an eighth characteristic of the second local signal.

68. An apparatus comprising:

a housing including a first extension and a second extension;

a first electrode carried by the first extension, the first electrode comprising a first transceiver to receive a first control signal;

a first filter communicatively coupled to the first transceiver to automatically dynamically modify a first frequency range of signals to be detected by the first electrode in response to the first control signal;

a second electrode carried by the second extension, the second electrode comprising a second transceiver to receive a second control signal; and

a second filter communicatively coupled to the second transceiver to automatically dynamically modify a second frequency range of signals to be detected by the second electrode in response to the second control signal;

wherein at least one of the first control signal received by the first transceiver or the second control signal received by the second transceiver is based on at least one of (a) a region of detection of the first electrode, (b) a region of detection of the second electrode, (c) a desired frequency band for analysis, or (d) a desired state of mind of a subject for analysis.

78. A method comprising:

accessing a first signal, a second signal, and a third signal from respective first, second, and third contacts of a first electrode, the first signal, the second signal, and the third signal gathered from a subject;

generating, via a first selector, a first local signal for the first electrode representative of a biological response by:

(1) discarding one of the first signal, the second signal or the third signal based on at least one of (a) a first

characteristic of the first signal, (b) a second characteristic of the second signal or (c) a third characteristic of the third signal; and

(2) combining two of the first signal, the second signal and the third signal to form the first local signal representative of the biological response, the two of the first signal, the second signal and the third signal excluding the discarded one of the first signal, the second signal and the third signal;

accessing a fourth signal, a fifth signal, and a sixth signal from respective fourth, fifth, and sixth contacts of a second electrode, the fourth signal, the fifth signal, and the sixth signal gathered from the subject;

generating, via a second selector, a second local signal representative of the biological response by:

(1) discarding one of the fourth signal, the fifth signal or the sixth signal based on at least one of (a) a fourth characteristic of the fourth signal, (b) a fifth characteristic of the fifth signal or (c) a sixth characteristic of the sixth signal; and

(2) combining two of the fourth signal, the fifth signal and the sixth signal to form the second local signal representative of the biological response, the two of the fourth signal, the fifth signal and the sixth signal excluding the discarded one of the fourth signal, the fifth signal and the sixth signal; and

selecting, via a third selector, one of the first local signal or the second local signal to represent the biological response based on at least one of (a) a seventh characteristic of the first local signal or (b) an eighth characteristic of the second local signal.

App. Br. 54–55, 59, 61–62 (Claims App'x).

The following rejections are on appeal:

Claim 78 stands rejected under 35 U.S.C. § 101 as directed to patent-ineligible subject matter. Final Action 2–3.

Claim 68, and each claim depending therefrom, stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. *Id.* at 3–4.

Claim 70 stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. *Id.* at 4.

Claim 73 stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. *Id.* at 4–5.

Claim 68 stands rejected under 35 U.S.C. § 112, second paragraph, as indefinite. *Id.* at 5.

Claim 75 stands rejected under 35 U.S.C. § 112, second paragraph, as indefinite. *Id.* at 5–6.

Claim 73 stands rejected under 35 U.S.C. § 112, second paragraph, as indefinite. *Id.* at 6.

Claims 49, 51–57, 60, 62, 65–67, 74, 75, 76, and 78 stand rejected under 35 U.S.C. § 103(a) over Washbon,[2] Alhussiny,[3] and Uchiyama.[4] *Id.* at 6.

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[2] U.S. Patent App. Pub. No. US 2007/0225585 A1 (pub. Sept. 27, 2007) ("Washbon").
[3] U.S. Patent App. Pub. No. US 2010/0042012 A1 (pub. Feb. 18, 2010) ("Alhussiny").
[4] U.S. Patent App. Pub. No. US 2008/0306398 A1 (pub. Dec. 11, 2008) ("Uchiyama").

Claim 77 stands rejected under 35 U.S.C. § 103(a) over Washbon, Alhussiny, Uchiyama, and Snyder.[5] *Id.* at 11.

Claims 68, 70, and 71 stand rejected under 35 U.S.C. § 103(a) over Washbon, Alhussiny, Uchiyama, Snyder, and Levendowski.[6] *Id.* at 11.

Claims 58, 59, and 64 stand rejected under 35 U.S.C. § 103(a) over Washbon, Alhussiny, Uchiyama, and Gevins 038.[7] *Id.* at 12.

Claims 61 and 63 stand rejected under 35 U.S.C. § 103(a) over Washbon, Alhussiny, Uchiyama, and Gevins 419.[8] *Id.* at 13.

Claims 49, 50, 72, 73, and 78 stand rejected under 35 U.S.C. § 103(a) over Washbon, Alhussiny, and Humphrey.[9] *Id.* at 14.

DISCUSSION

Only those arguments made by Appellants in the Briefs have been considered in this Decision. Arguments not presented in the Briefs are waived. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2015). Unless otherwise indicated herein, we adopt the Examiner's findings of fact, reasoning on scope and content of the prior art, and conclusions set out in the Final Action and Answer regarding the rejection.

I. SECTION 112 ISSUES

Claim 68 and Written Description

The Examiner finds,

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[5] U.S. Patent No. 4,686,999 (issued Aug. 18, 1987) ("Snyder").
[6] U.S. Patent No. US 6,381,481 B1 (issued Apr. 30, 2002) ("Levendowski").
[7] U.S. Patent No. 4,967,038 (issued Oct. 30, 1990) ("Gevins 038").
[8] U.S. Patent No. US 6,434,419 B1 (issued Aug. 13, 2002) ("Gevins 419").
[9] U.S. Patent No. US 6,171,239 B1 (issued Jan. 9, 2001) ("Humphrey").

> [i]t is unclear where there is support for the signal being based on a region or brain state. It is unclear what is being claimed specifically here but if the signal is transmitted or selected based on region or state of mind it is unclear where this is mentioned in the specification.

Final Action 3–4. The Examiner further finds, "[t]he specification at ¶37 seems to just support the system receiving signals to dynamically change the frequency ranges but there is no mention of dynamically modifying a first set differently from how the second set is modified." *Id.* at 4. The Examiner indicates:

> The issue with the support for claim 68 is not that the parts are not taught individually but that the connection between the steps is not taught. The specification discloses the transceivers may also receive signals from an EEG system to dynamically modify frequency ranges. ¶38 broadly sets out modifying the range or selecting regional signals to discard but does not support the interpretation of controlling the signals based on features a-d or using two different control signals, a first control signal and a second control signal. Additionally, the signal used is received from an EEG system but is not disclosed to even be the EEG signal, so there is no support or connection between the characteristics a-d and the "control signal" of the range modification.

Id. at 3.

Appellants argue the claim does not recite a "brain state," or that a signal is "transmitted" or "selected," or "dynamically modifying a first set different from a second set." App. Br. 22. Appellants point to Figure 3 and ¶ 38 of the Specification as describing an apparatus having an electrode (three electrodes) and transmitters/transceivers for receiving signals from the EEG system to dynamically modify the frequency ranged to be detected, etc. *Id.* at 25. Such a configuration is present in each electrode. *Id.* at 25–26

(citing Spec. ¶¶ 17, 23, 26, 29, 32, 36–46, FIG. 3). Appellants argue the Specification describes that the invention takes into account fluctuations occurring across regions of the brain/head and describes various brain wave frequencies associated with different mental states/states of mind to be studied/analyzed. *Id.* at 25–28 (citing Spec. ¶¶ 21, 52–56, 61). Appellants argue the Examiner's understanding of the claim language is incorrect and the control signals are not EEG signals, but are control signals for the operation of the headset. Reply Br. 17 (citing Spec. ¶ 38).

We find Appellants have the better position. A description adequate to satisfy 35 U.S.C. § 112, first paragraph, "must 'clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.' In other words, the test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (citation omitted, alteration in original).

We do not find the language of claim 68 unclear and find it supported by the Specification's disclosure. For example, we note the Specification (¶¶ 13–14) identifies that well-known subject matter is not discussed in detail and that some techniques or mechanisms are described in the Specification in singular way for clarity, but can be performed or provided in multiple instantiations. The Specification (¶ 21) explains "[a] system also may select a regionally preferred signal from a group of electrodes," and further discusses (¶¶ 21, 36) how the disclosed apparatus and system can take measurements or receive signals across different regions of the brain

and how the system can select regionally preferred signals from groups of electrodes. Further, the Specification (¶¶ 26, 38) explains the transceiver and filter configurations of its electrodes and how they function and that the transceivers can dynamically modify the frequency ranges to be detected at the electrodes. Further, the Specification (¶ 40) describes using controlled stimulus materials to elicit particular neurological response, e.g., indicative of specific mental states, and also explains (¶¶ 52–55) how different brain wave frequencies equate to different brain functions and brain states (e.g., sleeping, activity, connecting different parts of the brain, logic, etc.).

Because we find the Specification discloses the invention recited by claim 68, we reverse this rejection.

Claim 70 and Written Description

Claim 70 recites, "The apparatus of claim 68, wherein the first frequency range and the second frequency range are different frequency ranges." The Examiner finds "[i]t is unclear where there is support for dynamically modifying two frequency ranges and those ranges are different." Final Action 4.

Appellants cite the Specification ¶ 38 as describing transceivers that receive signals to dynamically modify the frequency ranges to be detected. App. Br. 29. Appellants identify that the Specification discusses that each electrode includes circuitry for this function and argue the Specification discloses "individualized electrodes performing localized and specific signal processing." *Id.* 29–30 (citing Spec. ¶¶ 17, 23, 26, 29, 32, 36–46, FIG. 3). Appellants do not argue that the Specification expressly describes "modifying the electrodes to operate on different frequencies," instead they

argue that it is "clear" that such "was within the possession of the inventors at the time of the application filing." *Id.* at 30.

"[W]hile the description requirement does not demand any particular form of disclosure, or that the specification recite the claimed invention *in haec verba*, a description that merely renders the invention obvious does not satisfy the requirement." *Ariad*, 598 F.3d at 1352 (citation omitted). "[A]n invention may be enabled even though it has not been described." *University of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 921 (Fed. Cir. 2004).

While Appellants may be correct that it might be possible or obvious for different electrodes of the invention described in the Specification to be set to filter for different signals, nothing in the Specification reasonably conveys to those skilled in the art that the inventor had possession of electrodes that do so. We find the Specification does not describe the invention defined by claim 70 and, so, affirm the rejection.

Claim 73 and Written Description

Claim 73 recites:

73. The headset of claim 72 further comprising:

a first housing, the first electrode, the second electrode, and the third electrode coupled to the first housing;

a second housing comprising:

a fourth electrode coupled to the second housing, the fourth electrode to produce a fourth local signal representative of a second biological response;

a fifth electrode coupled to the second housing, the fifth electrode to produce a fifth local signal representative of the second biological response; and

> a fourth selector to select one of the fourth local signal or the fifth local signal to represent the second biological response.

App. Br. 60.

The Examiner finds "[i]t is unclear where there is support for the second biological signal collected" and asks, "[i]s this just another EEG signal?" Final Action 4–5. Further, the Examiner finds, "[t]here is mention of EOG signals collected by the device but these are collected from separate sensors it appears not the electrodes that are recited in the claim relating to the headset." *Id.* at 5.

Appellants present no argument on this rejection.

"Filing a Board appeal does not, unto itself, entitle an appellant to de novo review of all aspects of a rejection. If an appellant fails to present arguments on a particular issue – or, more broadly, on a particular rejection – the Board will not, as a general matter, unilaterally review those uncontested aspects of the rejection." *Ex parte Frye,* 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential). We summarily affirm this rejection.

Claim 68 and Indefiniteness

The Examiner finds "[i]t is unclear what the last line [of claim 68] is stating specifically," and asks, "[i]s the signal selected or transmitted based on brain state or region or is the signal just supposed to be indicative of the state of mind or region?" Final Action 5. The last line (clause) of claim 68 recites,

> wherein at least one of the first control signal received by the first transceiver or the second control signal received by the second transceiver is based on at least one of (a) a region of detection of the first electrode, (b) a region of detection of the second

> electrode, (c) a desired frequency band for analysis, or (d) a desired state of mind of a subject for analysis.

App. Br. 59. The Examiner further finds, "[i]t is also unclear whether the transmitters referred to in the last three lines of the claim are supposed to be the transceiver or the different transmitters." *Id.*

Appellants focus on the claim language "a desired state of mind of a subject for analysis," and argue there is nothing inherently unclear about the language and, again, argue that the language "brain state" is not in the claim. App. Br. 31. Appellants also argue that the claim does not recite the language "transmitter." *Id.* at 32. Regarding a "state of mind," Appellants point to the Specification at ¶ 52 as describing how various brain waves, which can be detected and measured, can be indicative of respective states of mind (e.g., memory, emotion, attention, sensations, etc.). *Id.* Appellants further argue that the transceiver can be signaled to filter data collection based on these brain wave frequencies. *Id.*

We find Appellants have the better position. The language of claim 68 is not unclear, particularly in view of Specification, as identified by Appellants. We reverse this rejection.

Claim 75 and Indefiniteness

Claim 75 recites, "[t]he headset of claim 49, wherein the selected first local signal or second local signal is representative of the signals gathered by the first contact point, the second contact point, the third contact point, the fourth contact point, the fifth contact point and the sixth contact point." The Examiner finds "[i]t is unclear how the first local signal or second local signal is representative of all the contact points when only three points are associated with an electrode and one signal is discarded." Final Action 5–6.

Appellants argue that the skilled artisan would understand "picking a representative" of a set of contacts/signals "does not require exact duplication of the representative constituents." App. Br. 34.

According to our understanding of claim 49, the first local signal is the result of a first selector dropping one and combining the others of the signals at the 1st, 2nd, and 3rd contacts of a first electrode and the second local signal is the same as relates to a second selector and the 4th, 5th, and 6th contacts of a second electrode. Thus, each of the two electrodes' collective contacts and signals is represented by a final respective local signal. The third selector chooses one of the first or second local signals to be designated as representative of them all. The language of claim 75 is not unclear and the rejection is reversed.

Claim 73 and Indefiniteness

The Examiner finds "[i]t is unclear what the second biological response is," and asks, "[w]as there a first biological response or is that the first biological signal?" Final Action 6. The Examiner further finds, "Examiner's broadest reasonable interpretation is that this is an EEG signal that is just different from the first biological signal disclosed in the preceding claims." *Id.*

Appellants do not present an argument and we summarily affirm this rejection. *See Ex parte Frye,* 94 USPQ2d at 1075.

II. OBVIOUSNESS

Findings of Fact Relating to Obviousness:

We set forth the following findings of fact to highlight certain evidence.

FF1. Washbon is directed to and discloses, "[a]n electrode headset in which electrodes can be mounted." Washbon Abstract; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF2. Washbon discloses:

> The electrodes described herein are particularly suitable to a non-clinical application, where the subject's comfort and ease of use are important factors, although they can be used in a clinical application as well. The embodiments of dry electrodes described are advantageous for using the electrode headsets described herein, as they can provide a strong and clear signal even through a subject's hair and without use of a wetting fluid.

Washbon ¶ 20; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF3. Washbon discloses:

> In one implementation, the one or more electrodes include signal acquisition electrodes configured to detect signals such as electroencephalograph (EEG) signals, electro-oculograph (EOG) signals, or similar electrical potentials in the body. Signals detected by the electrodes in the headset **102** are fed through a sensor interface **104** and digitized by an analog to digital converter **106**. Digitized samples of the signal captured by each of the electrodes can be stored during operation of the system **100** in a data buffer **108** for subsequent processing.

Washbon ¶ 41; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF4. Washbon discloses, "The system **100** further includes a processing system **109**." Washbon ¶ 42; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF5. Washbon discloses an exemplary electrode-holding headset at FIG.5A, reproduced below:

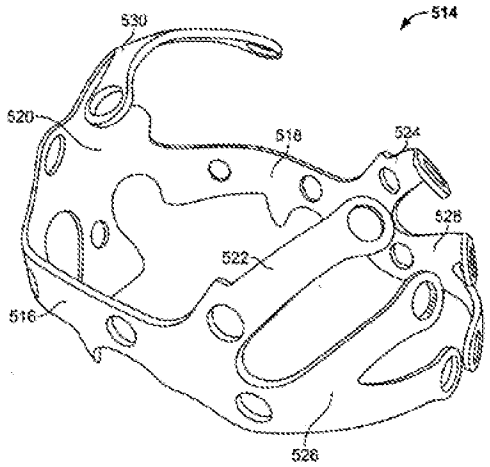

FIG. 5A

FIG. 5A (above) shows an "implementation of a rigid electrode headset." Washbon ¶ 26. Washbon explains, "[t]he electrode headset **514** is formed from a rigid yet flexible material, and is configured to fit a range of head shapes and sizes, while maintaining suitable pressure of electrodes mounted therein against the subject's head," and "the electrode mounts are apertures configured to receive and mount an electrode therein." Washbon ¶¶ 67, 69; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF6. Washbon discloses an electrode that can be mounted within a headset (as shown above in preceding finding of fact) where the electrode includes "a housing **972**," "a printed circuit board (PCB)

984" having "electronic circuit components forming a sensor circuit . . . to provide power to the circuit and permit signals to be sent from the sensor circuit to a signal acquisition system," and "contact elements **976** configured to contact the subject's skin," where "[b]ioelectrical potentials from the subject's skin detected by the gimbaled contact **974** are thereby provided to the electrode plate **982** and ultimately to the sensor circuit included in the PCB **984**." Washbon ¶¶ 92–94; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF7. Washbon illustrates an electrode, as just described in the preceding finding of fact, at FIG. 9A, reproduced below:

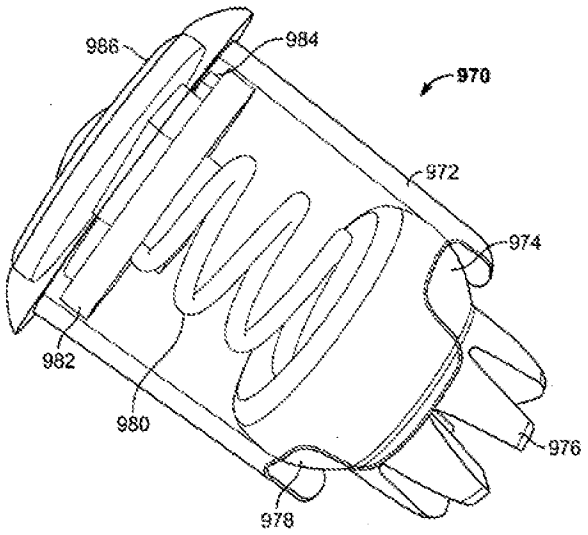

FIG. 9A

FIG. 9A of Washbon (above) illustrates an electrode for use with its otherwise-disclosed headset, as described above.

FF8. Washbon discloses:

> Each electrode is electrically connected to electronic circuitry that can be configured to receive signals from the electrodes and provide an output to a processor. The electronic circuitry also may be configured to perform at least some processing of the signals received from the electrodes. In some implementations electronic circuitry mounted on or housed within the electrode headset can be configured to perform some or all of the functions of the sensor interface **104**, A/D converter **106**, data buffer **108**, processing system **109** and/or platform **120**.

Washbon ¶ 125; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF9. Washbon discloses, "the electrode headset arrangement described herein can be used with other known electrode arrangements. Moreover the electrode arrangements described herein can be used to detect other types of bioelectric potentials on parts of the body other than the head, e.g. ECG." Washbon ¶ 132; *see also* Final Action 6–16, 18–19, and Ans. 4–6 (discussing Washbon).

FF10. Alhussiny is directed to and discloses:

> [a] bio-physiological interface [that] is self-contained with onboard intensification, filtering, and signal processing and is wirelessly enabled (idio-electrode), with multiple sensory system for bio-physiological measurements, described herein utilizes spatially resolved potential profiles from a cluster of mini electrodes to form constituent sets comprising mini sensorial electrodes. The sets of sub electrodes containing the clusters are jointly optimized to attain measurable gradient of some diagnostic value.

Alhussiny Abstract, ¶ 10; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF11. Alhussiny discloses using its sub-electrode system for "acquiring a biophysiological signal" and "detecting signals from . . .

brain tissue." Alhussiny ¶¶ 15, 18, 19, 55; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF12. Alhussiny discloses

> the steps of acquiring the biophysiological signal, filtering the biophysiological signal, selecting the permutation of sub-electrodes that optimizes the filtered biophysiological signal wherein the optimized signal results in a baseline signal, and wirelessly transmitting the baseline signal to a receiver. In some embodiments, the biophysiological signal is acquired from . . . brain tissue.

Alhussiny ¶ 19; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF13. Alhussiny discloses a "'macro-electrode' [composed of] a group of two or more sub-electrodes" ¶ 38 and illustrates such an macro-electrode at FIG. 5, reproduced below:

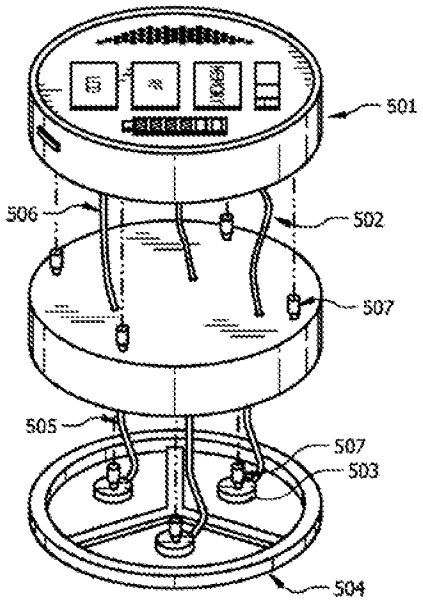

FIG. 5

"FIG. **5** shows an expanded view of the macro-electrode wherein **501** represents the processing unit, . . . **503** represents the sub-electrode, . . . **506** represents a connection to transfer data and/or power between the power source and the processing unit," and also shows an "RF" (radio frequency) subunit as a part of the processing unit. Alhussiny ¶ 26; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF14. Alhussiny discloses "the present invention utilizes temporal and spatial-resolved detection of bio-physiological potential to obtain discernable waveforms for diagnostic purposes." Alhussiny ¶ 56; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF15. Alhussiny discloses, "the biophysiological signal is filtered to obtain a signal between 0.5 Hz to 10,000 Hz. In specific embodiments, the biophysiological signal is filtered to obtain a signal between 0.5 Hz to 60 Hz." Alhussiny ¶ 19; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF16. Alhussiny discloses, "optimizing the biophysiological signal is achieved by minimizing the noise and maximizing the signal," and

> [a]ll sub electrodes terminate into an addressable multiplexer and are controlled by instructions from a microprocessor, digital signal processor (DSP), or any other digital processor. Various miniature electrodes or sub-electrodes are combined into their prospective sets to form the minimum 2 or 3 constituent sets. These sets represent the potential points to obtain spatio-temporal waveform excursions, reflective of the cardiac generator that is least noisy. The sets of clusters, comprising the

> sub-electrodes, are arranged to discern or maximize the signal gradient with the least interference noise.
>
> The selection of the two or three sub-electrodes within the electrode cluster may not necessarily form a[n] adjacent set of sub-electrodes. This condition provides a resource for optimizing the maximum potential gradient. In some situations, the optimal mode is to combine miniature electrodes or sub-electrodes to contribute to a stable gradient.

Alhussiny ¶¶ 19, 59–60; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF17. Alhussiny discloses, "the sub-electrodes will be parsed and optimized according to set of criteria to form sets of either two or three electrodes" and "[t]he two sub-electrodes that give the minimum noise and maximum signal provide one criterion for selecting the sub-set of electrodes," and further "[t]he sub-electrode by sub-electrode that gives the minimum noise and the maximum signal is selected. In some examples of the present invention, all remaining sub-electrodes may be used to return current." Alhussiny ¶¶ 61, 62; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF18. Alhussiny discloses "[t]he macro-electrode also comprises a processing unit. This processing unit has a number of functions including, but not limited to, processing and filtering the biophysiological signal, finding the permutation of sub-electrodes that minimize the noise and maximize the signal, wirelessly transmitting and receive data." Alhussiny ¶ 74; *see also* Final Action 6–16, 18, and Ans. 4–5 (discussing Alhussiny).

FF19. Uchiyama is directed to and discloses:

> A brain wave detecting apparatus includes a plurality of brain wave detecting portions that are arranged on a side surface of a head and detect brain waves of the head, a selecting portion selecting one of the plurality of brain wave detecting portions on the basis of brain wave signals transmitted from the plurality of brain wave detecting portions, and a transmitting portion transmitting information about the brain wave signal transmitted from said one of the plurality of brain wave detecting portions.

Uchiyama Abstract; *see also* Final Action 6, 8, 10–14, and Ans. 4 (discussing Uchiyama).

FF20. Uchiyama discloses an

> apparatus has a plurality of brain wave detecting portions **10**, each being composed of a brain wave sensor (BWS) **12**, a filter (FLT) **14**, and an amplifier (AMP) **16**. Further, the brain wave detecting apparatus includes multiple analog-to-digital converters (ADC) **18**, a processing portion **20**, a memory (MEM) **22**, a battery (BATT) **24**, a radio frequency (RF) circuit **26**, and an antenna **28**.

Uchiyama ¶ 14; *see also* Final Action 6, 8, 10–14, and Ans. 4 (discussing Uchiyama).

FF21. Uchiyama discloses "the processing portion **20** acquires the brain wave signals transmitted from the multiple (five) brain wave detecting portions **10**," and

> the processing portion **20** compares the brain wave signals transmitted from the brain wave detecting portions **10** with each other (step **S14**). Then, the processing portion **20** selects the brain wave detecting portion **10** that is to be used, according to the brain wave signals from the brain wave detecting portions **10** (step **S16**). For example, the processing portion **20** may select one brain wave detecting portion **10** that transmits the strongest brain wave signal among the plurality of the brain wave detecting portions **10**. In another example, the processing portion **20** may

> select another brain wave detecting portion **10** that transmits the most stable brain wave signal for the given time.

Uchiyama ¶ 17; *see also* Final Action 6, 8, 10–14, and Ans. 4 (discussing Uchiyama). In this way, "the processing portion **20** (selecting portion) selects the brain wave detecting portion **10** that is to be used from among the plurality of the brain wave detecting portions **10**, based on the brain wave signals." Uchiyama ¶ 20; *see also* Final Action 6, 8, 10–14, and Ans. 4 (discussing Uchiyama).

FF22. Humphrey discloses, "neurally generated electrical signals, recorded with microelectrode technologies from within the brain or with surface electrodes from extracranial sites." Humphrey 3:17–19; *see also* Final Action 14, 16 (discussing Humphrey).

FF23. Humphrey discloses, brain-neuronal-activity sensors composed of a plurality of "recording tips **14**" and "electronic microchips . . . [for] amplification, filtering, multiplexing, and radio transmission of signals to external receivers." Humphrey 4:44–47, 8:5–6; *see also* Final Action 14, 16 (discussing Humphrey).

FF24. Further to the immediately preceding finding of fact, Humphrey discloses "[o]nce a subset of signals has been selected for control of an arm prosthesis (or other device), according to one aspect of the preferred embodiment, the signals should still be mathematically combined for optimal control of that device," and "correlations, selection of the channels **118** that will be most useful for control of movements or movement-related parameters of the external device," and "selection of the subset **118** of channels that will

be used." Humphrey 5:40–44, 13:3–13; *see also* Final Action 14, 16 (discussing Humphrey).

FF25. Snyder discloses "this invention concerns a multi-channel ventilation monitor and a method for real time monitoring of multiple signals associated with breathing and cardiovascular activity," and identifies as a deficiency in the prior art "the inability of [] systems to dynamically accommodate, or adjust, themselves to changes in the body position or the level of [] activity of the monitored subject." Snyder 1:8–11, 2:35–39; *see also* Final Action 11–12, and Ans. 5 (discussing Snyder).

FF26. Snyder discloses a microprocessor associated with its sensors, having

> functions include[ing]: (1) continuous monitoring of the input signals from each of these sensors; (2) continuous updating of its own data base on the monitored individual to detect trends in the physiological activities; (3) dynamic adjustment of the gain of the variable gain amplifier to accommodate changes in the level of physiological activity and dynamic adjustment of the various filters (band pass and low pass filters) to compensate for changes in signal frequency content incidental to such activity level variations; (4) analyzing the wave form of the input signal for characteristic shapes associated with abnormal breathing activity; (5) continuous monitoring of the system performance and operation for malfunctions.

Snyder 6:30–44; *see also* Final Action 11–12, and Ans. 5 (discussing Snyder).

FF27. Snyder also discusses combining and averaging separately sensor-acquired bio-data and discloses

> characteristic wave features are also reviewed by the system logic in its evaluation and identifications of cardiac signal trends. The system logic then proceeds to update the cardiac statistics by averaging the recently obtained data with that previously acquired. It is this averaging of data which enables the system logic to predict trends in cardiac activity and dynamically adjust the gain accordingly.

Snyder 9:13–20; *see also* Final Action 11–12, and Ans. 5 (discussing Snyder).

Discussion Relating to Obviousness:

Claims 49 and 78 (and dependent claims) and Obviousness over Washbon, Alhussiny, and Uchiyama or Humphrey.

In rejecting the claims as obvious, the Examiner combines Washbon, Alhussiny, and Uchiyama or Humphrey. The Examiner cites Washbon as generally disclosing a headset with multiple electrodes for sensing brainwaves. Final Action 6–7 (citing Washbon ¶ 56, FIGs. 3B–C, FIG. 9). The Examiner combines with Washbon, Alhussiny's disclosure of electrodes composed of sub-electrodes, where the signals at such sub-electrodes are selected so as to cluster the sub-electrodes with the least noise and best signals, and discarding sub-optimal sub-electrodes' signals. *Id.* at 7–8 (citing Alhussiny ¶¶ 5, 9, 47, 49, 55, 60, 62, FIG. 2, FIG. 5). To this the Examiner added Uchiyama's disclosure of selecting electrodes' signals from brain regions based on the quality of signal. *Id.* at 8 (citing Uchiyama ¶¶ 6, 17, 20). The Examiner also cites Humphrey as teaching selecting groups of spatially dispersed electrode contacts for processing and, thus, controlling an external device; selecting certain contacts' signals for usefulness (and

deselecting others) and then combining those selected signals. Final Action 16 (citing Humphrey 5:40–60, 12:55–13:30).

We find the Examiner has established that the appealed claims would be obvious over Washbon, Alhussiny, and Uchiyama or Humphrey. We agree with the Examiner's position that the combination of Washbon, Alhussiny, and Uchiyama or Humphrey teaches or suggests claim 49's headset with two (or more) electrodes, each electrode having several contacts (EEG sub-electrodes) for gathering bio-signals (e.g., indicative of certain brain-wave frequencies, e.g., 0.5–60 Hz, relating to respective brain-function states), and selectors (processor) for choosing which signals of those contacts to discard (filtering) and which to keep and combine (so as to use an optimal, maximized, noise-reduced signal), as well as the selector to choose from among the signals of the plurality of electrodes for a representative signal, and also transmitting the bio-signals to a system (e.g., EEG). FF1–FF24. These combined references also teach or suggest using such an apparatus in a method of acquiring, choosing, discarding and combining such bio-signals, and ultimately selecting a representative signal from the electrodes, as defined by claim 78. *Id.* The cited references are each directed to related subject matter, that is, using electrode systems to collect bio-signals, and the skilled artisan would be motivated to combine the features of each reference for the advantages identified therein, with a reasonable expectation of successfully doing so. "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

Having carefully considered Appellants' arguments and evidence, we find Appellants have not produced evidence showing, or persuasively argued, that the Examiner's determinations on obviousness are incorrect. We address Appellants' arguments below.

Appellants argue that none of the cited references teaches or suggests the recited "selector[s]" that discard and combine the biological response signals. App. Br. 38. Appellants argue the Examiner does not address the express limitations of the claims when discussing the prior art. *Id.* at 39. Appellants argue none of the references disclose the claimed headset and contend Alhussiny is directed to a cardiac sensor device that does not combine signals, but detects a potential difference between electrodes. App. Br. 39–40. Regarding Humphrey, Appellants essentially repeat their earlier arguments regarding the cited prior arts' lack of combining two signals to form a first local signal representative of a first biological response. App. Br. 42–43.

Regarding Appellants' argument concerning the recited "selector[s]," the prior art discloses electrodes with processors that perform signal filtering, signal selecting, signal discarding, signal combining, and signal transmitting, at the direction of the system at-large. *See* FF1–FF24. Such electrodes and their internal circuitry meets the claim limitations. Regarding Appellants' argument that the Examiner did not specifically-enough address the claims on an element-by-element basis, we find the prior art cited by the Examiner, as well as the Examiner's rational on how and why the skilled artisan would have combined the prior art, is adequate to support the prima facie case for obviousness, as discussed above. Regarding Appellants'

argument that Alhussiny is directed to cardiac sensors and does not combine signals, while cardiac bio-sensing might be Alhussiny's primary focus, the reference is explicit that its electrodes are suitable for sensing brain signals, and the reference is equally explicit that its devices do select and combine signals. *See* FF11, FF12, FF16. Regarding Appellants' argument on Humphrey, it is largely cumulative of their other arguments and is unpersuasive for the same reasons. *See* FF22–FF24.

Appellants also separately argue that claim 73 is patentable over Washbon, Alhussiny, and Uchiyama. App. Br. 44. Appellants argue that claim 73 recites "a second housing" also having respective electrodes like the first housing and that the cited references do not teach a third selector to select either a first or second signal to represent the first biological response or the fourth selector to select either a fourth local signal or fifth local signal to represent a second biological response. *Id.*

Appellants' argument over claim 73, is merely directed to, e.g., adding another "arm" onto the headset as another housing and another electrode like the other recited electrodes, with the same or similar functionality. This is obvious over Washbon. *See* FF5.

For the reasons discussed above, we affirm the rejection.

Claim 77 and Obviousness over Washbon, Alhussiny, Uchiyama, and Snyder.

Claim 77 recites "[t]he apparatus of claim 49, wherein the first selector is to combine the two of the first signal, the second signal and the third signal by averaging the two of the first signal, the second signal and the third signal." App. Br. 61. The Examiner cites Snyder as disclosing

averaging separately collected bio-signal data. Final Action 11 (citing Snyder 9:15–20).

Appellants argue none of the cited art teaches discarding signals and combining signals as recited by the claims. App. Br. 46. That this feature is taught or suggested by the prior art is addressed, *supra*. Appellants argue that Snyder's disclosed averaging data relating to cardiac statistics to allow logic to predict trends in cardiac activity and dynamically adjust the gain accordingly, "has nothing to do with [the] discarding one of three signals and combining, by averaging, the remaining two signals, as recited in claim 77." *Id.* at 47. Regarding this argument, the Examiner cites Snyder merely for the proposition that separately collected data on bio-signals can advantageously be averaged. App. Br. 11. Thus, the reference is relevant.

Appellants argue the Examiner is misinterpreting claim 77 (and 49) as reciting that an averaging of signals causes the discarding of a signal. Reply Br. 21. We do not find the Examiner has so-interpreted the claims and, in any event, the cited prior art teaches or suggests the claimed subject matter where signals collected from electrodes are either selected or not and, if selected, are combined and averaged. FF10, FF12, FF16–FF21, FF24, FF25–FF27. Appellants argue Snyder discloses averaging new and old cardiac data, and that is different from averaging two signals gathered by two electrode contact points, per claim 77. *Id.* We do not find this argument persuasive; as just discussed, Snyder suggests that averaging bio-signal data is advantageous.

For the reasons above we affirm this rejection.

Claim 68 (and depending claims) and Obviousness over Washbon, Alhussiny, Uchiyama, Snyder, and Levendowski.

Appellants argue that claim 68 recites that the apparatus's electrodes comprise transceivers and that such a configuration is not disclosed by Washbon, Snyder, or Levendowski (or the other cited art). App. Br. 48, 50. Appellants argue that Washbon's disclosure of wireless communications does not teach this electrode-transceiver configuration. *Id.* at 48. Appellants argue any teaching by Snyder of dynamically adjusting filters or signals indicative of the region of the brain or state of mind does not teach and is irrelevant regarding such electrode-transceiver configuration limitations. *Id.* at 49–50. Appellants state that Levendowski does not cure these deficiencies, and neither do Alhussiny and Uchiyama. *Id.* at 50.

We are not persuaded by Appellants' arguments. The combination of Washbon, Alhussiny, and Uchiyama teaches or suggests all the components of the electrodes (carried by extensions on a housing) recited by claim 68 (e.g., transceivers/transmitters, filtering circuitry) and the designation of data (brain signals based on region, frequency, or state of mind) to be collected by the electrodes' contacts. FF1–FF21. Snyder, as cited by the Examiner, teaches or suggests that a microprocessor should be provided (for each electrode as suggested by Alhussiny) to monitor the signals received by the sensors and dynamically adjust how data is collected or filtered at the sensors (e.g., "adjustment of the gain"). FF26. Thus, we agree with the Examiner that the combined prior art would render obvious the recited, "transceiver to automatically dynamically modify a [] frequency range of signals to be detected by the [] electrode in response to the [] control signal."

Appellants separately argue over claim 71, which recites "[t]he apparatus of claim 68, wherein the housing comprises a comb," specifically regarding the term "comb." Reply Br. 22. Appellants take issue with the breadth of the Examiner's interpretation of "comb," as a "simple toothed instrument," arguing that this would improperly and unreasonably ensnare things like a bicycle sprocket or a saw. *Id.* 22–23. Appellants contend the plain meaning of "comb" is consistent with the definition found in the Merriam-Webster's dictionary, i.e., "a flat piece of plastic or metal with a row of thin teeth that **is used for making hair neat** . . . a : a toothed instrument used **especially for adjusting, cleaning, or confining hair**." *Id.* at 22 (emphasis original). Appellants contend Washbon does not teach or suggest a "comb." *Id.* at 23.

Regarding claim 71, we find Appellants' argument persuasive. Nothing disclosed in Washbon (or any other cited reference) looks like or functions as a comb. Below, we compare Figure 1B of the Specification, which is a comb, with Washbon's FIG. 5A, which is a headset and shaped similarly to a comb in some ways, but would not function as a comb (and the Examiner provides no evidence to support that it would).

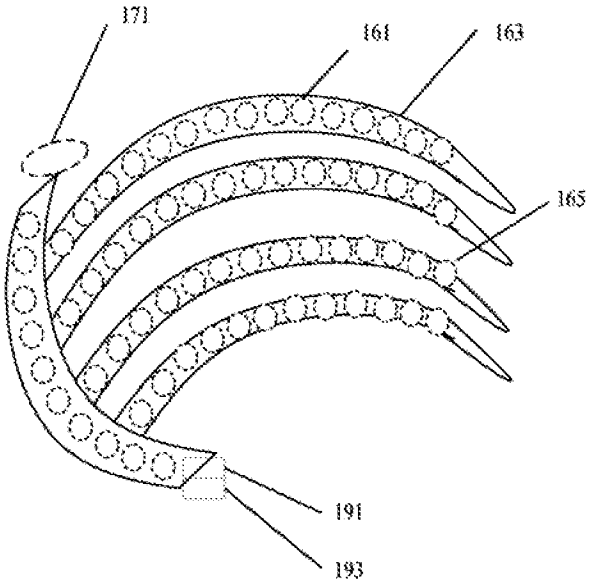

Figure 1B

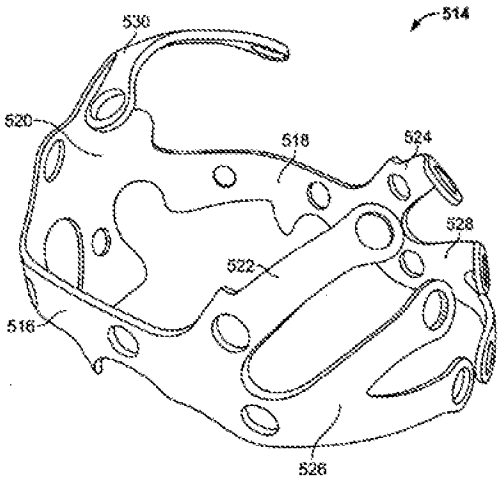

FIG. 5A

Specification Figure 1B (above, left) shows an apparatus of the disclosed invention shaped as a four-pronged comb. Washbon's FIG. 5A (above right) shows an EEG headset, otherwise described at FF5, *supra*.

For the reasons above, we affirm the rejection as to claims 68 and 70 and reverse as to claim 71.

Claims 58, 59, and 64 and Obviousness over Washbon, Alhussiny, Uchiyama, and Gevins 038.

Regarding claims 58 and 59, the Examiner cites Gevins 038 for teaching a dry electrode with electrodes with an insulator rubber base, electrodes with a rectangular cross-section and conical tips, and where contact points are electrically isolated from each other. Final Action 12–13 (citing Gevins 038 4:57–5:45, 5:1–5, Figs. 3–4). Regarding claim 64, the

Examiner cites Gevins 038 for teaching an encoder for digitizing and multiplexing data. *Id.* 13 (citing Gevins 038 6:4–20).

Appellants do not present an argument and we summarily affirm this rejection. *See Ex parte Frye,* 94 USPQ2d at 1075.

Claims 61 and 63 and Obviousness over Washbon, Alhussiny, Uchiyama, and Gevins 419.

Regarding claim 61, the Examiner cites Gevins 419 as teaching an EEG collection and analysis system that removes eye artifact data with a contaminant filter. Final Action 13 (citing Gevins 419 18:36–43). Regarding claim 63, the Examiner cites Gevins as teaching using EEG electrodes to gather eye movement data (to later filter out the contaminants). *Id.* at 14 (citing Gevins 419 1:1–10, 18:36–43).

Appellants do not present an argument and we summarily affirm this rejection. *See Ex parte Frye,* 94 USPQ2d at 1075.

III. PATENT-ELIGIBILITY OF CLAIM 78

The Examiner finds claim 78 is directed to the abstract idea of "collecting and analyzing EEG [data/signals]," without significantly more so as to provide an inventive concept for patent-eligibility. Final Action 2–3. The Examiner summarizes the rejection as follows:

> Claim 78 recites the abstract idea of generating, via a first selector, a first local signal for the first electrode representative of a biological response and generating, via a second selector, a second biological response representative of a biological response. The generating of signals in this case amounts simply to data manipulation and mathematical algorithm by which data (signals) are subtracted and added, where mathematical algorithm is no more than an abstract idea. The claim(s) does/do

> not include additional elements that are sufficient to amount to significantly more than the judicial exception because the additional sensors is/are merely for data input, are well-known, routine, and conventional in the art, and are used in extra-solution activity. Similarly, the recitation of the selectors and of accessing, discarding, combining and selecting of data merely links the abstract idea to well-understood, routine, and conventional activities, previously known to the industry, and specified at a high level of generality.

Ans. 2–3.

Appellants argue the Examiner has failed to identify an abstract concept to which the claim is directed. App. Br. 13. Appellants also argue, somewhat in conflict with this argument, that the claim "clearly does not preempt all use of the alleged 'abstract idea' of 'collecting and analyzing EEG.'" *Id.* at 13–14. Appellants argue the Examiner has over-generalized the claim in analyzing patent-eligibility. Reply Br. 4.

"Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work." *Mayo Collaborative Servs. v. Prometheus Labs, Inc.*, 566 U.S. 66, 71 (2012) (quoting *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). In analyzing patent-eligibility questions under 35 U.S.C. § 101, the Supreme Court instructs us to "first determine whether the claims at issue are directed to a patent-ineligible concept." *Alice Corp. Pty Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014). If the initial threshold is met, we then move to a second step and "consider the elements of each claim both individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the

claim' into a patent-eligible application." *Id.* (quoting *Mayo*, 566 U.S. at 97).

Taking up the first step of the patent-eligibility analysis, we find claim 78, even though requiring concrete and tangible components such as contacts of electrodes, is directed to the abstract idea of information/data management and it is apparent that the recited physical components merely provide a generic and well-known platform upon which to carry out the abstract idea. Similar to the facts of *In re TLI Comm. LLC*, 823 F.3d 607, 611–12 (Fed. Cir. 2016), the method of the claim is not directed to an improvement in EEG device technology, as all the features of the utilized system are shown, as discussed *supra*, to be well-known, but is directed simply to choosing (selector/processor) what data to keep and what data to discard, and grouping the kept data, i.e., organizing data, using the tangible components of such technologies only in their generic ways.

Appellants compare claim 78 to the invention found patent-eligible in *Diamond v. Diehr*, 450 U.S. 175 (1981). Reply Br. 5. In *Diehr*, the claims recited math-based method steps, which in and of themselves would be mere abstract ideas; however, these math-based steps were implemented to an actual and specific purpose of identifying the optimal time to open a rubber press to optimally cure the rubber within, which provided a technological improvement. There is no equivalent, concrete technological improvement recited by claim 78, thus, here, *Diehr* is not determinative on patent-eligibility.

Regarding Appellants' contention regarding not preempting the technical field, "[w]hile preemption may signal patent ineligible subject

matter, the absence of complete preemption does not demonstrate patent eligibility." *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1871, 1379 (Fed. Cir. 2015). "Where a patent's claims are deemed only to disclose patent ineligible subject matter under the *Mayo* [*Alice*] framework, as they are in this case, preemption concerns are fully addressed and made moot." *Id.*

Turning to the second step under *Alice*, we find that the steps recited by the claim, individually and as a combined whole, cannot confer patent-eligibility. The application of technology in claim 78 is in line with the well-known, routine functionality of the technology, e.g., selectors function as processors to process data, electrode contacts sense electrical signals; nothing significantly more is added. Thus, as did the Federal Circuit in *In re TLI*, we find that the steps recited by these claims, individually and as a combined whole, cannot confer patent eligibility. *In re TLI*, 823 F.3d at 613–15; *see also SmartGene, Inc. v. Advanced Bio. Labs SA*, 555 Fed. App'x 950, 955–56 (Fed. Cir. 2014) (claims drawn to organizing patient information and analyzing it as a doctor would were directed to an abstract idea and requiring a computer to do this was not enough to convey patent-eligibility).

For the above reasons, we find that claim 78 is directed to abstract, patent-ineligible subject matter without significantly more to bring the abstract idea into the realm of patent-eligibility and the respective rejection must be affirmed.

SUMMARY

The rejection of claim 78 under 35 U.S.C. § 101 is affirmed.

The rejection of claim 68, and each claim depending therefrom, under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, is reversed.

The rejection of claim 70 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, is affirmed.

The rejection of claim 73 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, is affirmed.

The rejection of claim 68 under 35 U.S.C. § 112, second paragraph, as indefinite, is reversed.

The rejection of claim 75 under 35 U.S.C. § 112, second paragraph, as indefinite, is reversed.

The rejection of claim 73 under 35 U.S.C. § 112, second paragraph, as indefinite, is affirmed.

The rejection of claims 49, 51–57, 60, 62, 65–67, 74, 75, 76, and 78 under 35 U.S.C. § 103(a) over Washbon, Alhussiny, and Uchiyama is affirmed.

The rejection of claim 77 under 35 U.S.C. § 103(a) over Washbon, Alhussiny, Uchiyama, and Snyder is affirmed.

The rejection of claims 68, 70, and 71 under 35 U.S.C. § 103(a) Washbon, Alhussiny, Uchiyama, Snyder, and Levendowski is affirmed as to claims 68 and 70 and reversed as to claim 71.

The rejection of claims 58, 59, and 64 under 35 U.S.C. § 103(a) over Washbon, Alhussiny, Uchiyama, and Gevins 038 is affirmed.

The rejection of claims 61 and 63 under 35 U.S.C. § 103(a) over Washbon, Alhussiny, Uchiyama, and Gevins 419 is affirmed.

The rejection of claims 49, 50, 72, 73, and 78 under 35 U.S.C. § 103(a) over Washbon, Alhussiny, and Humphrey is affirmed.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART